

전통의 새로운 가치! Creative KIOm



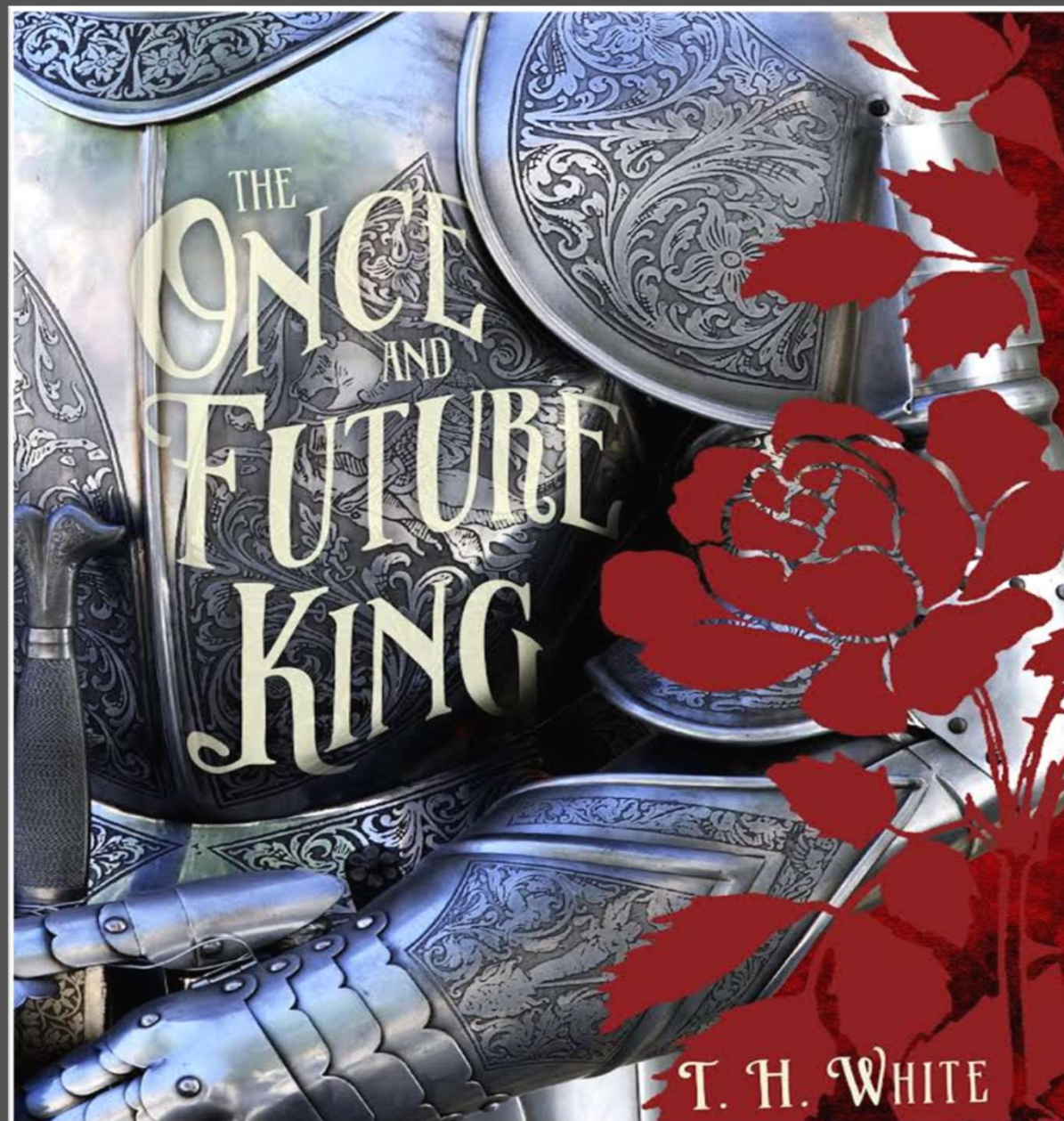
# 인공지능의 등장과 미래 의료 환경의 변화

한국한의학연구원  
미래의학부  
이 상 훈



Everything  
which is not  
forbidden is  
allowed.

<The Once and Future King.  
T.H.White>



정책

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홈 &gt; 제약산업 &gt; IT-U health

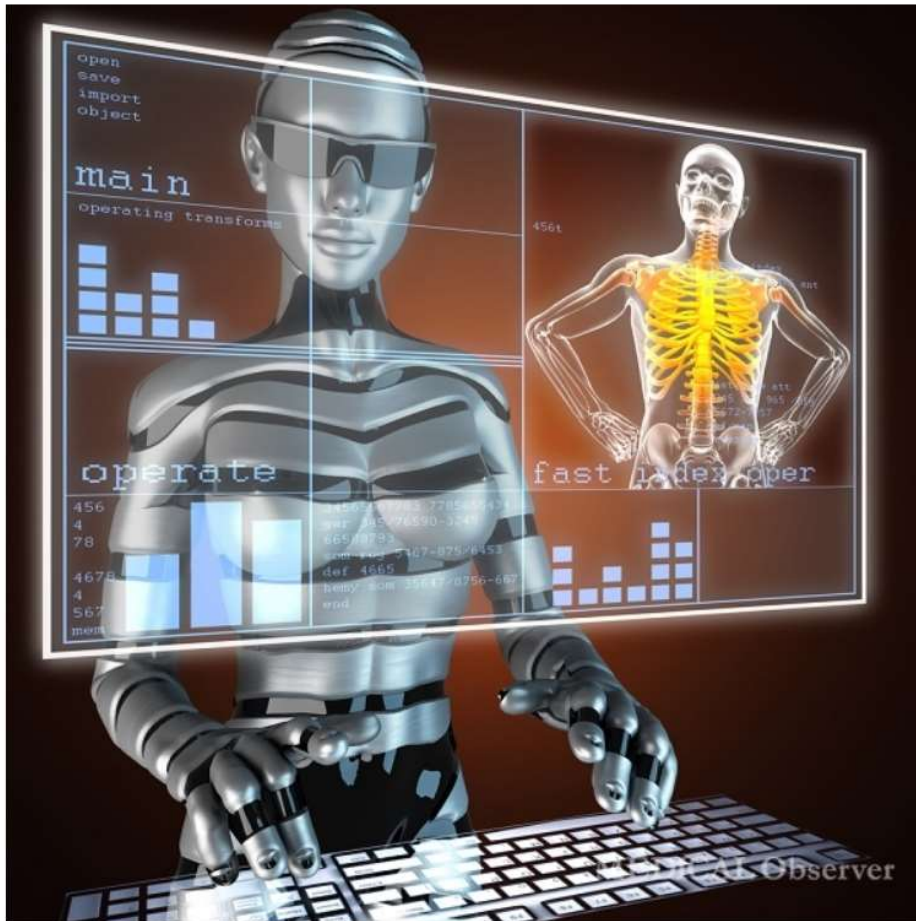
## AI 결정판 '알파고' 일반의 대체할까?

고용정보원, 주요직업 자동화가능성 발표...일반의사 AI 대체확률 '94%'

양영구 기자 | yggyang@monews.co.kr



[0회] 승인 2016.03.26 06:56:13



■ 전문간호사 활성화-리베이트 약가인하법 '의결'

## 보건의료분야 직업의 자동화 대체 확률

직업명	인공지능 자동화 대체확률	대체순위	불가능순위
일반의	94%	55위	352위
치과의사	16.20%	266위	141위
간호사	15.40%	268위	139위
전문의	2.30%	338위	69위
한의사	0.10%	358위	49위

출처: 한국고용정보원 (총 406개 직업)

▲ 한국고용정보원이 분석한 주요직업의 자동화 대체 확률 중 보건의료분야 재구성

고용정보원이 분석한 결과에 따르면 일반의는 자동화 대체율이 94%로, 조사대상 직업 중 55위 (전체 406위), 대체 불가능 순위 352위에 이름을 올렸다.

이는 보건의료분야 직업 가운데 가장 높은 순위다.

아울러 치과의사 16.2%(대체 순위 266위, 대체 불가능 순위 141위) 간호사 15.4%(대체 순위 268위, 대체 불가능 순위 139위, 조산사 포함)를 기록했고, 전문의는 2.3%(자동화 대체순위 338위, 대체 불가능 순위 69위) 등의 순으로 나타났다.

반면 한의사는 0.1%를 기록하며 대체 순위 358위, 대체 불가능 순위 49위를 기록했다.



# 의료 인공지능의 등장

## 106 STARTUPS TRANSFORMING HEALTHCARE WITH AI



## 의료 인공지능의 등장





# AI & Deep Learning for Cancer Detection

Ahmed Serag, PhD  
Digital & Computational Pathology  
September 2018

innovation + you

PHILIPS

Identification of prostate cancer grade is an increasingly complex process

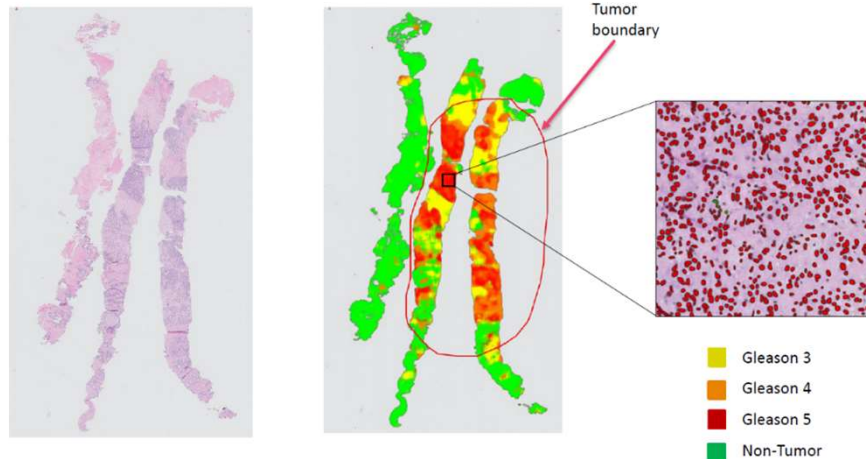
46% disagreement among pathologists in prostate cancer report

Source: "Frequency and determinants of disagreement and error in Gleason scores: a population-based study of prostate cancer," Prostate (2012)



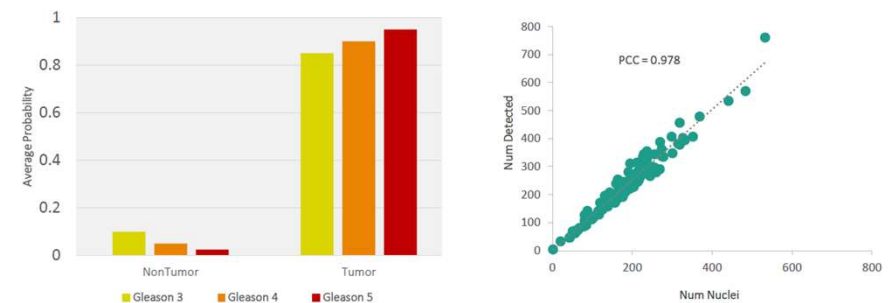
11

## Examples of result

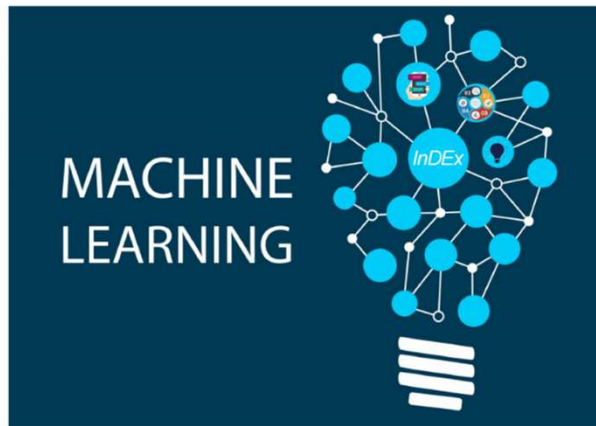


18

## Quantitative analysis



19



- User behaviours (insights);
- Stage transition (progress);
- Messaging (adherence);
- Note: Users do not directly interface with *MLaaS*;

Data problem: user persona data (synthetic)



## InDEx

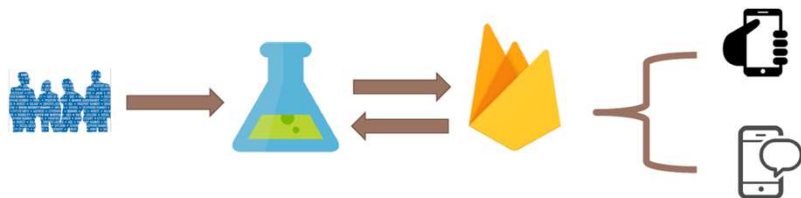
### Managing Alcohol Misuse by Automation

RE-WORK Deep Learning in Healthcare Summit, London 20<sup>th</sup> September 2018

Dan Leightley Post-Doc Researcher  
King's Centre for Military Health Research

 @\_Dr\_Daniel  
#reworkHEALTH

## Personalising the 'message'



Users select push notifications and/or text messages

We randomly select the communication channel

## Does it actually work?

Reported alcohol consumption	Week 1	Week 2	Week 3	Week 4
Drinking days	4.0	3.0	3.0	3.0
Drink free days	3.0	4.0	4.0	4.0
Units per drinking day	5.6	6.5	4.54	4.7
Units consumed	22.9	20.4	18.1	15.9
Alcoholic drinks per drinking day	2.0	3.0	2.0	2.0
Binge drinking days per week	2.0	2.0	1.0	2.0

Median.







# Alexa, öffne smart medication™

Sprachsteuerung für das  
digitale Patiententagebuch

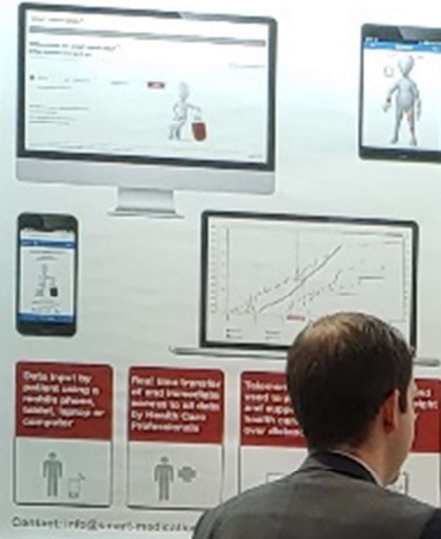
„Wann war meine  
letzte Gelenkblutung?“

„Dokumentiere eine  
neue Prophylaxe!“



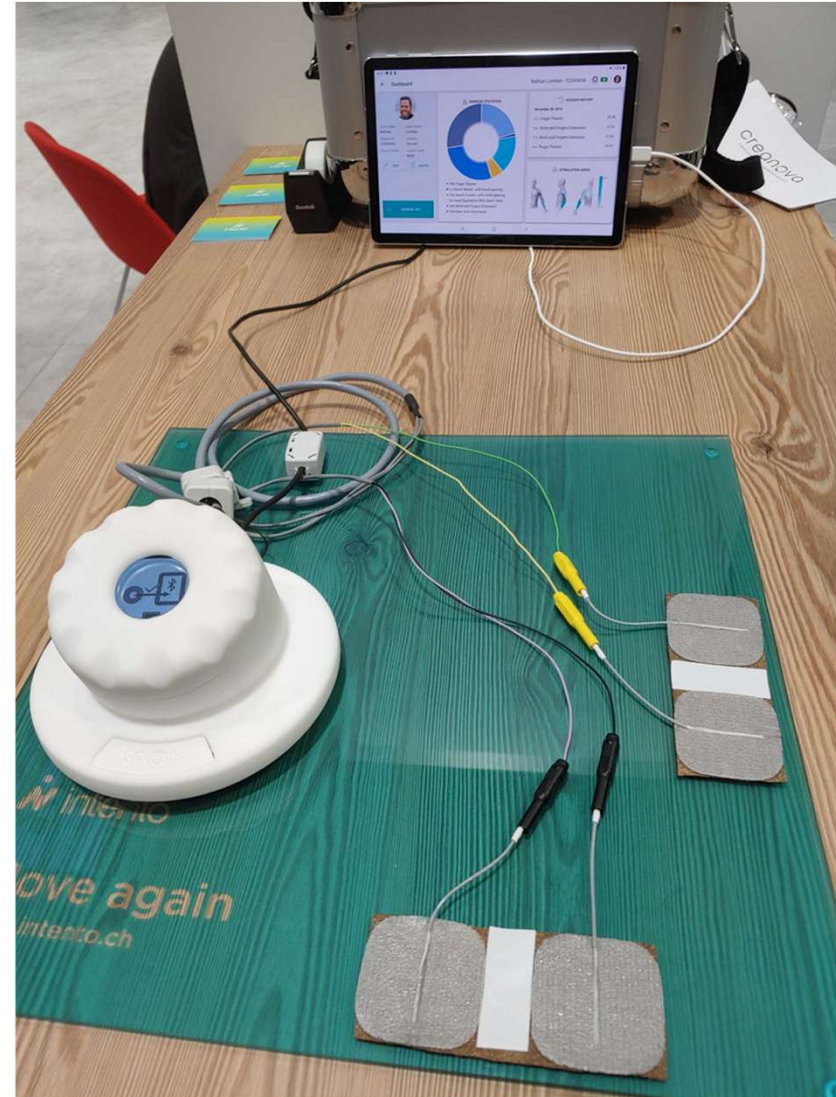
## smart medication™

Understanding and eHealth Solutions  
Connecting Patients with Health Care Professionals





# MEDICA 2019



# 의료 인공지능의 등장

(GANs:Generative Adversarial Networks)

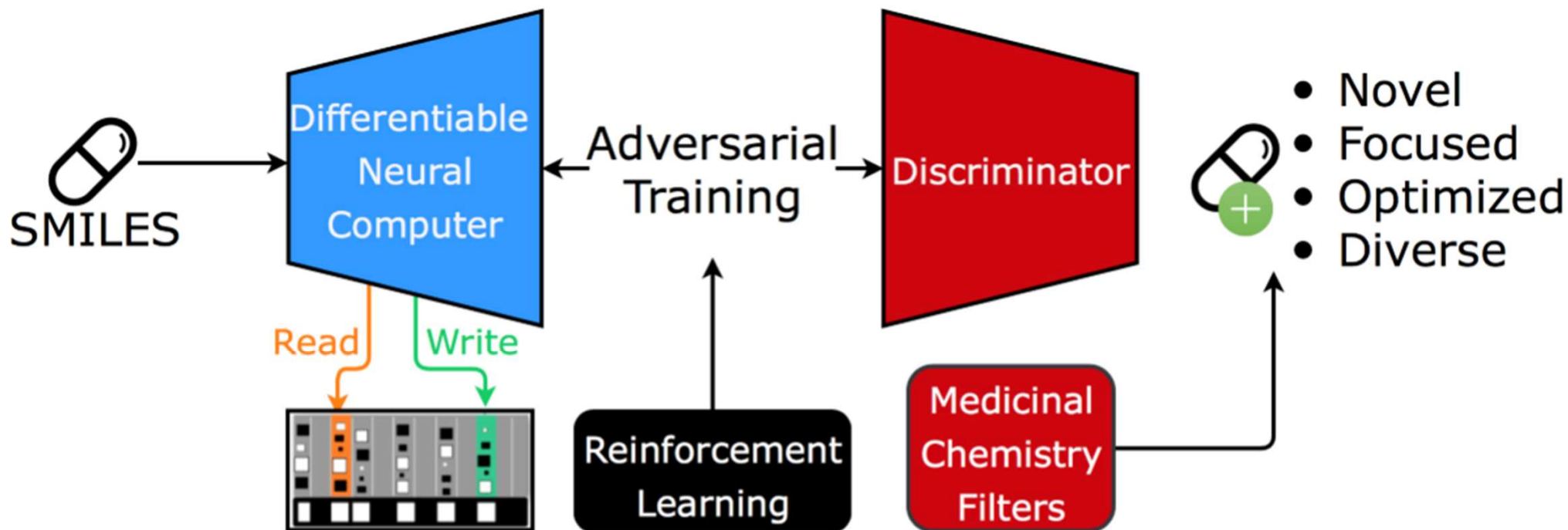




## 의료 인공지능의 등장

### REINFORCEMENT LEARNING FOR DRUG DISCOVERY

#### RANC



## 대화형 의료 인공지능

[illegible]

## 대화형 의료 인공지능

Selvy MediVoice

Account

compared with 이천십칠년 삼월 이십  
사일 CT semicolon 한줄띄고 일번  
 slightly decreased hematomas of  
right perirenal space and dilated  
right renal calyx and pelvis 줄바꾸고  
colon no change of focal  
 fragmentation of renal parenchyma  
한줄띄고 이번 decreased hematoma  
 extend to other portion of  
 retroperitoneal space 괄호열고  
 posterior aspect of liver comma  
 around IVC and adrenal gland 괄호  
닫고 한줄띄우고 삼번 no visible active  
 bleeding focus in this study

편집기   단축키 편집   환경설정   애플리케이션

Selvy MediVoice

Account

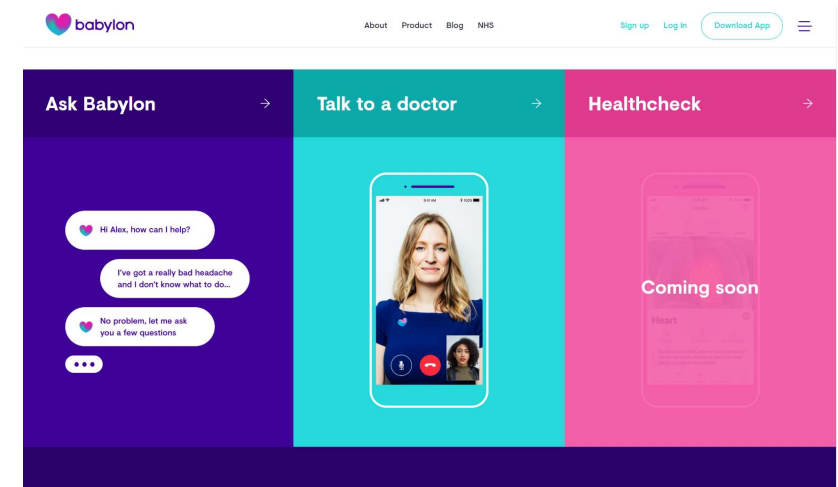
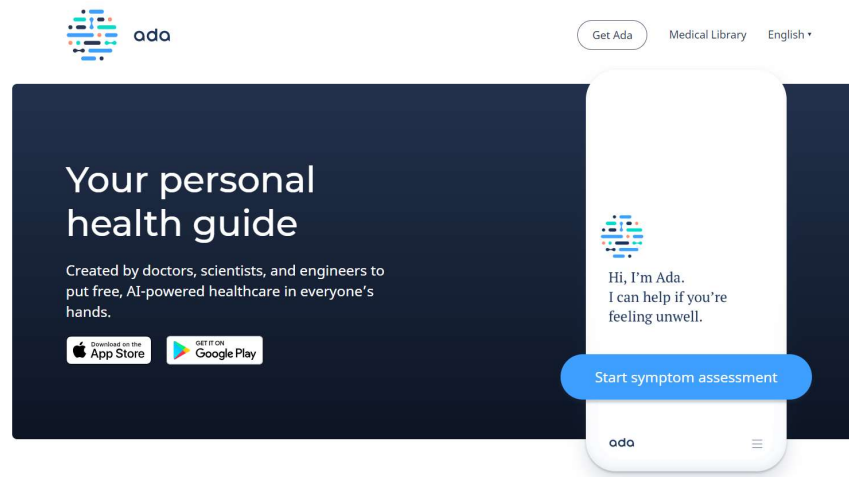
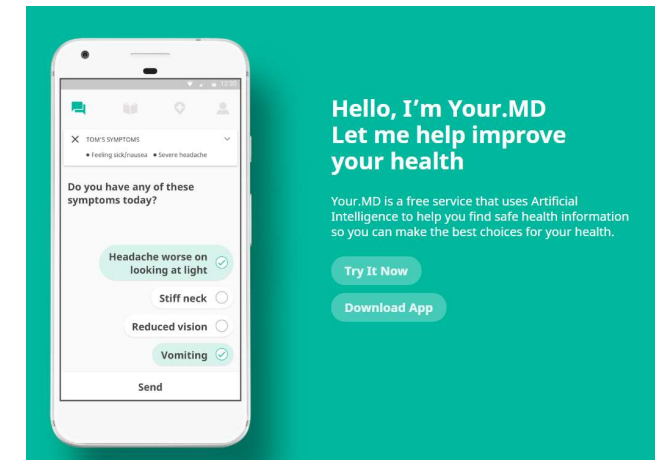
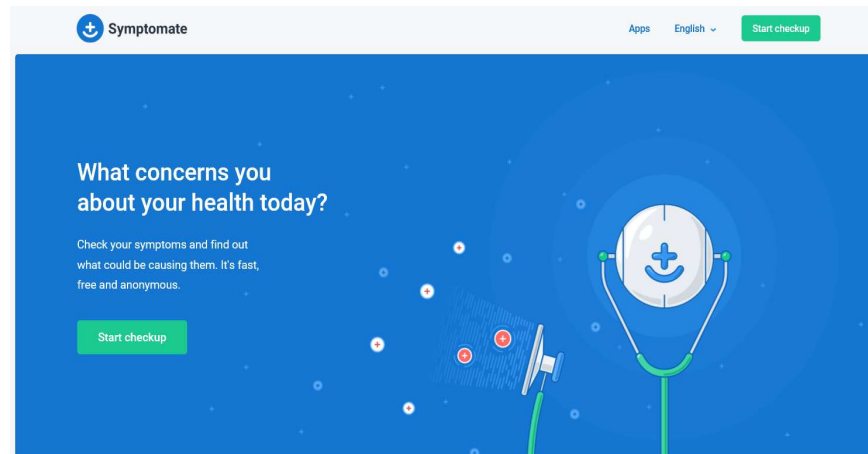
Compared with 2017-03-24 CT

- 1 Slightly decreased hematomas of Rt perirenal space and dilated Rt renal calyx and pelvis
- 2 No change of focal fragmentation of renal parenchyma
- 3 Decreased hematoma extend to other portion of retroperitoneal space
- 4 posterior aspect of liver comma IVC and adrenal gland
- 5 No visible active in this study

편집기



# 대화형 의료 인공지능



## 대화형 인공지능 활용의 실제 (in London)



**when it's less  
urgent than 999**

Call 111 if:

- You need medical help fast but it's not a 999 emergency
- You think you need to go to A&E or need another NHS urgent care service
- You don't know who to call or you don't have a GP to call
- You need health information or reassurance about what to do next

**AVAILABLE 24 HOURS A DAY, 365 DAYS A  
YEAR. CALLS ARE FREE FROM LANDLINES  
AND MOBILE PHONES**

## 대화형 인공지능 활용의 실제

### Babylon expands its AI technology to mainland China



Babylon has partnered with a Chinese internet company to help deliver personal health assessments and treatment advice across mainland China.

London-based Babylon, which powers the NHS's GP at Hand service, is providing its artificial intelligence (AI) technology to Tencent's WeChat social messaging platform.

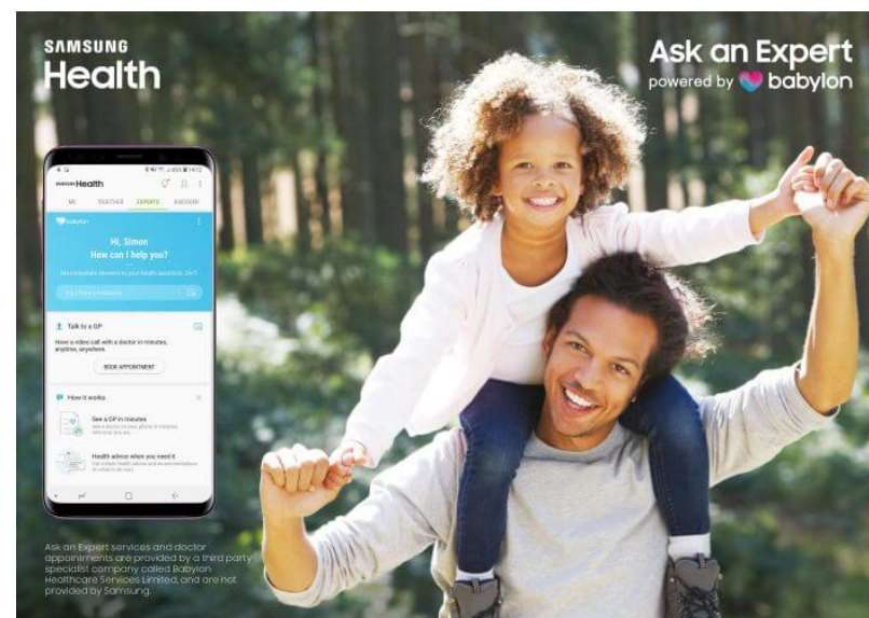
The deal means the one billion WeChat users can enter their symptoms to Babylon's app, which will then send back healthcare advice.

For example, when a user describes his or her symptoms or conditions to the system, Babylon's AI can analyse and form a personal assessment based on those inputs, while making recommendations as to whether the user should seek further consultation with a doctor.

Babylon-Samsung collaboration to equip phones with AI-enabled telemedicine app

June 6,  
2018

Collaboration,  
Technology,  
Telemedicine



Share on Facebook

Share on Twitter

Share on LinkedIn

Share on Google+

Share on Xing

### AI-enabled telemedicine app in Samsung smartphones

The app comes preloaded on select Samsung mobile models in the UK. It uses Babylon's software to provide live video chat with doctors and other health-related services to the users in the country.

Visiting a clinic or a hospital isn't a pleasant experience for most of us; it becomes a major hindrance for people with limited mobility. Thanks to Artificial Intelligence and innovations that it is making in the digital health services sphere, a doctor is now available at the touch of your fingertip.



## 의료 이용 관문의 변화

### 1<sup>st</sup> generation

- General practitioner chosen because of the close distance
- Experience of a close person(family, relatives, friends), rumor

### 2<sup>nd</sup> generation

- Experience of a close person(family, relatives, friends), rumor
- Googling, Social network service, Smartphone suggestion Apps

### 3<sup>rd</sup> generation

- Smartphone/Smart speaker based interactive AI doctor apps

**Medical services that are not included in the DB of the AI  
will be disappeared naturally.**

## Changes in Health record ownership

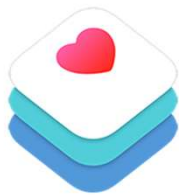
### From Hospital To Patient



자료: Health IT 홈페이지, HIPAA Right of Access Infographic<sup>9)</sup>

# Changes in Health

## From Hospitals



### HealthKit

Integrate HealthKit into your health and fitness apps for iOS and watchOS to create a more seamless user experience. When a customer provides permission for your app to read and write health and activity data to their Health app, your app becomes a valuable data source and can deliver deeply informed health and fitness solutions.



Vista Physician Group (Illinois)  
<http://www.vistaphysiciangroup.com/>

Wabash General (Illinois)  
<https://www.wabashgeneral.com/>

Waterbury Hospital (Connecticut)  
<https://www.waterburyhospital.org/>

Wayland Personal Physicians (Massachusetts)  
<https://www.waylandpersonalphysicians.com>

Wayne HealthCare (Ohio)  
<https://www.waynehealthcare.org/>

Weill Cornell Medicine (New York)  
<http://weill.cornell.edu>

West Broadway Clinic (Iowa)  
<http://www.westbroadwayclinic.com>

Wheeling Hospital, Inc. (West Virginia)  
<https://wheelinghospital.org/default.aspx>

Whiteville Eye Associates, P.A. (North Carolina)  
<http://whitevilleeye.com/>

Winona Health (Minnesota)  
<https://www.winonahealth.org>

Working For Life - Engineered Floors (Georgia)

WVU Medicine (West Virginia)  
<http://wvumedicine.org>

Yale New Haven Health (Connecticut)  
<https://www.ynhh.org>

Published Date: December 02, 2019

Helpful?

Yes

No



### Start a Discussion in Apple Support Communities

Ask other users about this article

Submit my question to the community

[See all questions on this article >](#)

### Contact Apple Support

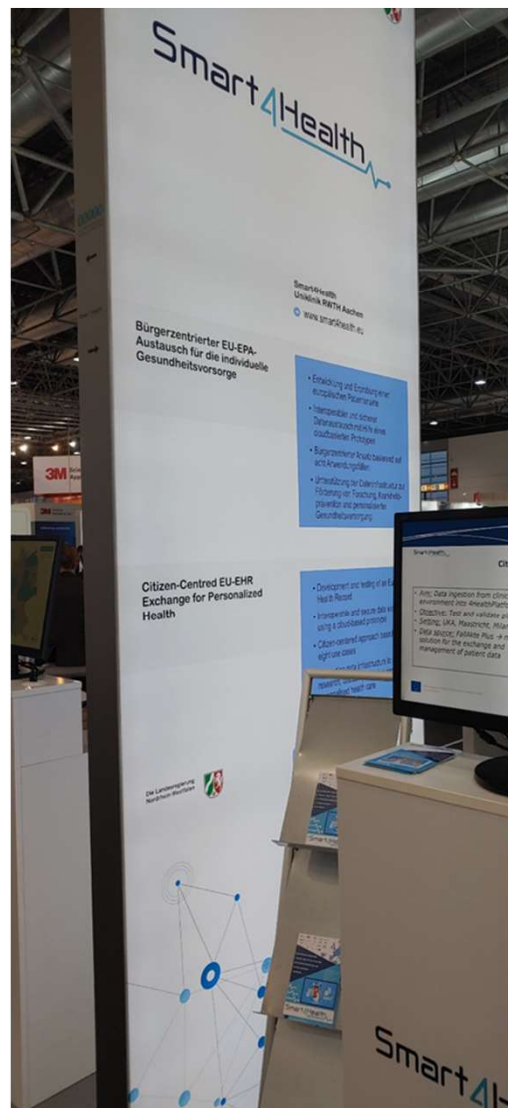
Need more help? Save time by starting your support request online and we'll connect you to an expert.

[Get started >](#)



Apple > Support > Institutions that support health records on iPhone and iPod touch





### Full Health Record collaboration between US and EU

A health data platform developed for you using New York City best practice digital health records.

> [read more](#)



### Back pain and musculoskeletal disease treatment

You oversee and manage all the data corresponding to your treatment even if you choose to visit a different medical center every time.

> [read more](#)



### Life and workplace, back pain prevention

You as a worker are fully in control of preventing back pain at work and at home with a medical doctor on demand.

> [read more](#)



### Hospital workplace, back pain prevention

You as a worker in an intensive care unit in a high technology and robot-supported environment are fully in control of preventing back pain at work.

> [read more](#)



### Full Health Record throughout EU

Access, share and update your health data everywhere in Europe.

> [read more](#)



### Back pain and musculoskeletal prevention

You are supported by digital devices during prevention training allowing a sport scientist to monitor your training.

> [read more](#)



### Caregivers' workplace, back pain prevention

You as a Caregiver are fully in control of preventing back pain at work and at home with a medical doctor on demand.

> [read more](#)



### Regional health, tourists, preparedness, back pain prevention

You are one of many in a fully integrated environment.

> [read more](#)



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- Fax: 0341 / 97-16729
- E-Mail: [info\[at\]smith.care](mailto:info[at]smith.care)

imprint

GEFÖRDERT VOM



Bundesministerium  
für Bildung  
und Forschung



MEDIZIN  
INFORMATIK  
INITIATIVE



# SMITH

Smart Medical Information  
Technology for Healthcare

CONTACTS



informatics Initiative of the BMBF  
Self in the Health IT Forum of

informatics Initiative with  
panel of experts at the  
sseldorf: Impulses for the  
a-driven medical research

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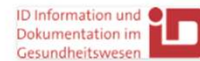
March Internetwork Services AG Essen



Averbis GmbH Freiburg



ID GmbH & Co. KGaA Berlin



research center Jülich



University Hospital Halle (Saale)



University Hospital Bonn



University Hospital Hamburg-Eppendorf



University Medicine Essen



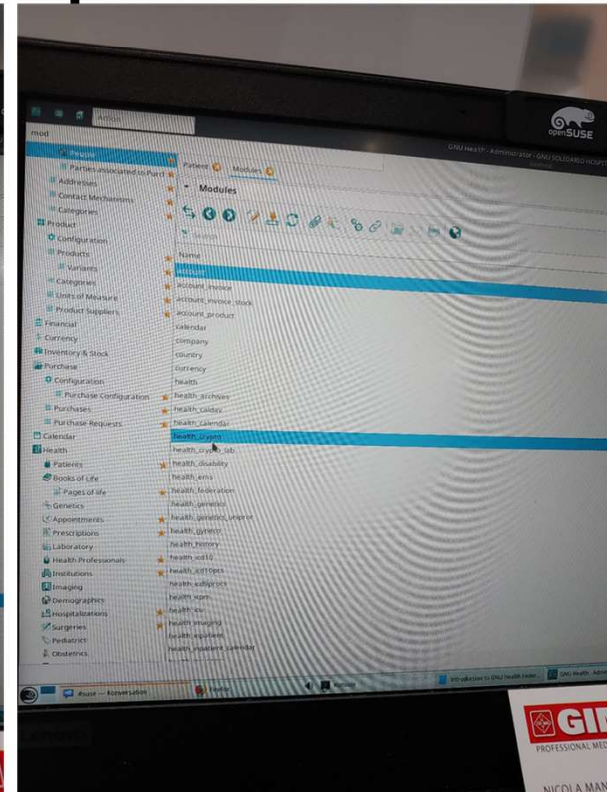
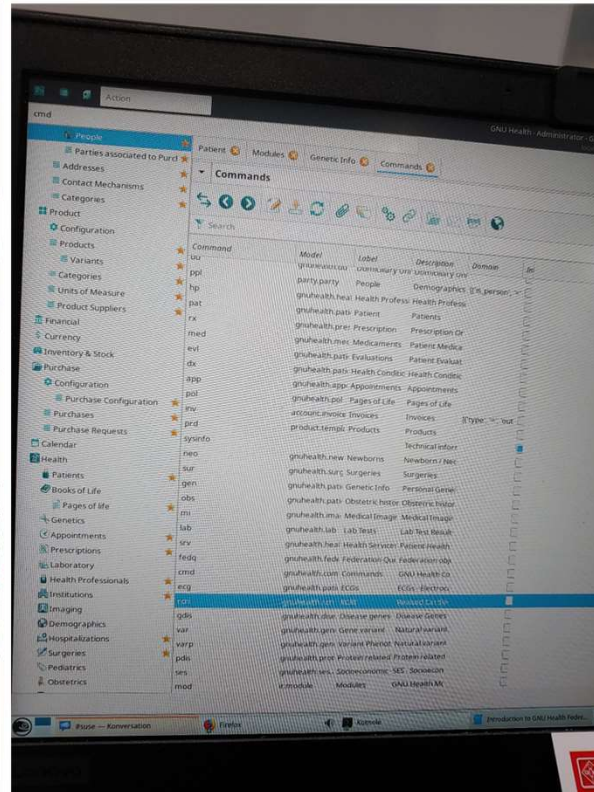
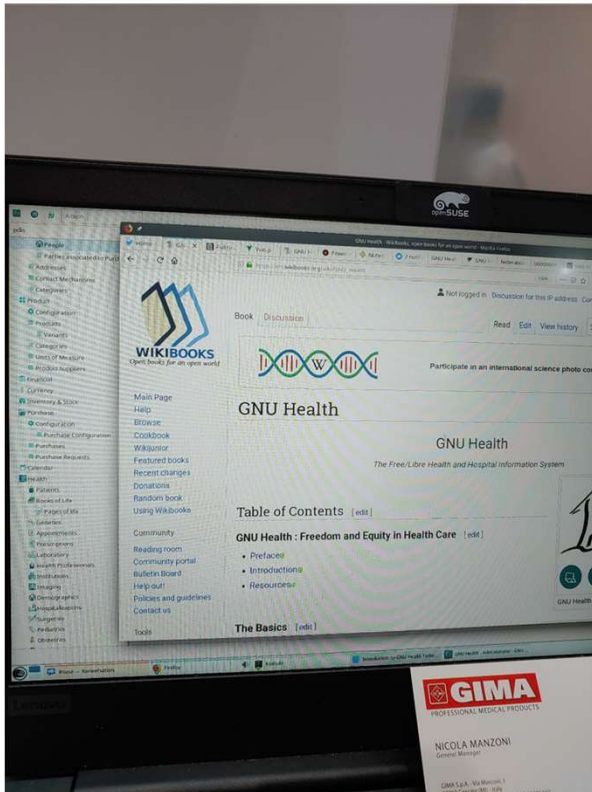
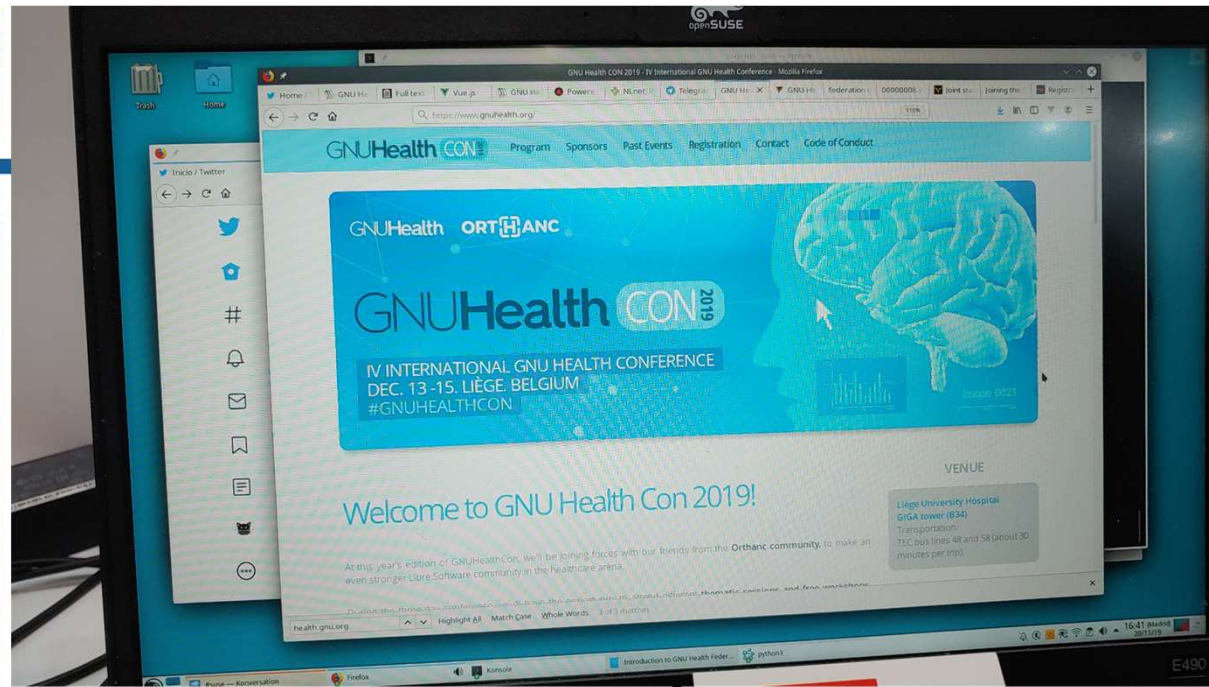
University Medical Center Rostock



University Hospital Düsseldorf











## Some projects around the world



Mahosot Hospital  
LAOS



Ministry of Health  
JAMAICA



All India Institute of  
Medical Sciences (AIIMS)  
INDIA



Centre of Medical  
Research of Franceville  
GABON



Cruz Roja Mexicana  
MEXICO



Hospital San Martín  
(UNER)  
ARGENTINA



Center for Medical  
Rehabilitation (CMR)  
LAOS



Bafia Hospital  
CAMEROON



Bikop Health Centre  
Cameroon



Dr. Akbar Niazi Teaching  
Hospital  
PAKISTAN



Sharab Medical Center  
GAMBIA



Centro de Salud  
Humberto D'Angelo  
ARGENTINA

## AI기반 정밀의료 솔루션 추진단

### AI기반 정밀의료 솔루션 추진단은

서울아산병원 등 전국 25개 상급·종합병원과 19개 ICT·SW 기업으로 구성된  
국내 최초·최대의 병원·기업 연합 컨소시엄입니다.

의료 현장에 적용 가능성이 높은 8개 중점 질환에 대하여

다양한 의료데이터를 활용한 지능형 소프트웨어를 개발하고 의료 빅데이터 응용 플랫폼을



## 보건의료 빅데이터 시범사업 3대 원칙

- 1 보건의료 빅데이터는 공공적 목적으로 활용
- 2 시민참여 · 전문성에 기반한 논의구조 구축
- 3 현행 법령에 근거하여 정보주체의 권리를 철저히 보호



시범사업 소개



데이터 신청



데이터 카탈로그 조회

### 데이터 신청 현황



신청접수	6 건
심의 중	85 건
처리완료	4 건

### 공지사항

- 데이터 이용신청서 출력 방법 안내 2019/11/04
- 플랫폼 서비스 정기점검안내 (매... 2019/10/31
- (개통안내) 국민이 원하는 보건... 2019/07/25
- 보건의료 빅데이터 시범사업 추... 2019/07/22

### 데이터 제공 심의 일정

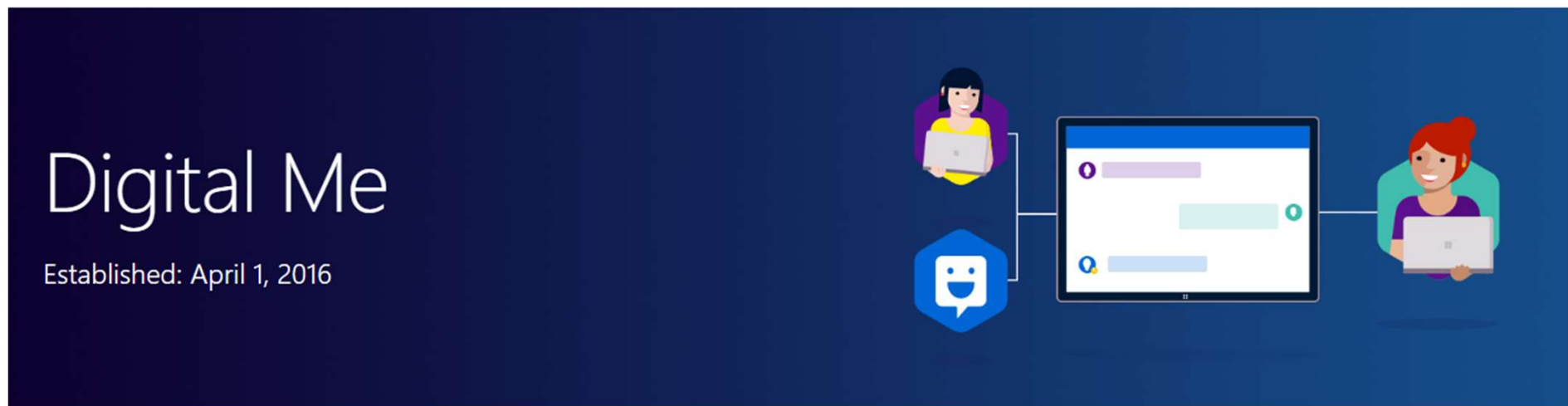
정책심의위원회		연구평가소위원회	
5차	04.15	5차	12.09
6차	09.06	6차	12.10

### FAQ

- 데이터 이용 신청 시 기관생명... 2019/11/08
- 폐쇄환경에서 사용할 수 있는... 2019/11/08
- 데이터 신청 시 제출서류에 "[... 2019/10/14
- 데이터 신청 시 제출 서류에 "[... 2019/10/14



## Virtual Human Digital Twin



Digital Me (DM) aims to digitalize knowledge of each person for building her personal “Avatar”, through which way the DM agent of each individual can participate in digital work and life activities on behalf of this person for improving her productivity. DM agent could be considered as extended and never lose memory of each person. It can handle repeat work of each person in digital format. It can participate in social communications on behalf of each person.

## Virtual Human Digital Twin

[Sign in](#)[Join now!](#)

PATIENTS CONDITIONS TREATMENTS SYMPTOMS **RESEARCH**

Our Science

### DigitalMe™

**DigitalMe™ will combine multiple sources of your health data;** pulling together your experiential, environmental, biological and medical information to create a digital version of you. Based on your condition, what we're seeing across conditions, and what we're learning from the data – we'll choose from the most advanced scientific resources available today like machine learning to examine your RNA and DNA, your proteins, antibodies, microbiome and metabolites. We're stretching the limits of breakthrough technologies to find answers.


## Virtual Human Digital Twin

- ❖ A virtual simulation model that predicts the occurrence of diseases and symptoms through individual genetic information and bio-signals, and further predicts selection of treatment technology or selection of health care services






# Virtual Human Digital Twin



**VPH Institute**  
Building the Virtual Physiological Human

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05/04/2018

**VPH2020 IN PARIS**

The VPH Institute is happy to announce that VPH2020, the next VPH conference on in silico medicine, will be in Paris, organised by Inria and partners.



● ● ● ● ● ● ●

## WELCOME TO THE VPH INSTITUTE

We are an international non-profit organisation incorporated in Belgium, whose mission is to ensure that the Virtual Physiological Human is fully realised, universally adopted, and effectively used both in research and clinic.

READ MORE

# 가상 생리학적 인체(Digital Twin)의 등장


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## BioGears

BioGears is an open source, comprehensive, extensible human physiology engine released under the Apache 2.0 license that will drive medical education, research, and training technologies. BioGears enables accurate and consistent physiology simulation across the medical community. The engine can be used as a standalone application or integrated with simulators, sensor interfaces, and models of all fidelities.

## What Can BioGears Do?

Several features set BioGears above the rest:

- BioGears includes mathematical models for a wide range of systems, medical interfaces, and substances for real-time retrieval of accurate physiology state.
- The common data model includes standard inputs, outputs, units, conversions, and naming conventions that make model additions and product integration quick and easy.
- Our website is a place for discussion and sharing among our community of users. Explore showcase scenarios, participate in the forums, and use the tutorials to guide BioGears integration.
- A full-featured API, SDK, code-based documentation, and tutorial examples make BioGears easy to understand and use. Rigorous validation methods ensure accurate model output.



# 가상 생리학 인체(Digital Twin)의 등장

## Scenario Timeline

### Environment Change

Comment: High altitude  
Conditions File: CheyenneMountainAprilCool.xml

### Patient is fatigued

### Patient has Hypoxia

### Environment Change

Comment: Increased ambient temperature  
Conditions File: CheyenneMountainAprilWarm.xml

INSULT  
0:00 min

INSULT  
1:00 min

### Exercise

Comment: Moderate hiking  
Intensity: 0.1

EVENT  
1:05 min

### Patient has Tachypnea

INSULT  
11:00 min

### Environment Change

Comment: Increased temperature  
SurroundingType: Not Set  
Air Velocity: Not Set  
Ambient Temperature: 20(degC)  
Atmospheric Pressure: Not Set  
Clothing Resistance: Not Set  
Emissivity: Not Set  
Mean Radiant Temperature: 20(degC)  
Relative Humidity: Not Set  
Respiration Ambient Temperature: 20(degC)

INSULT  
21:00 min

## Heat Stroke

The heat stroke scenario simulates the body's temperature regulation system. This scenario highlights the ability of the BioGears® physiology engine to simulate the energy exchange between the human body and the environment.

See the [Validation Matrix](#) for more details about the narrative and validation of the combined insult and intervention physiologic effects.





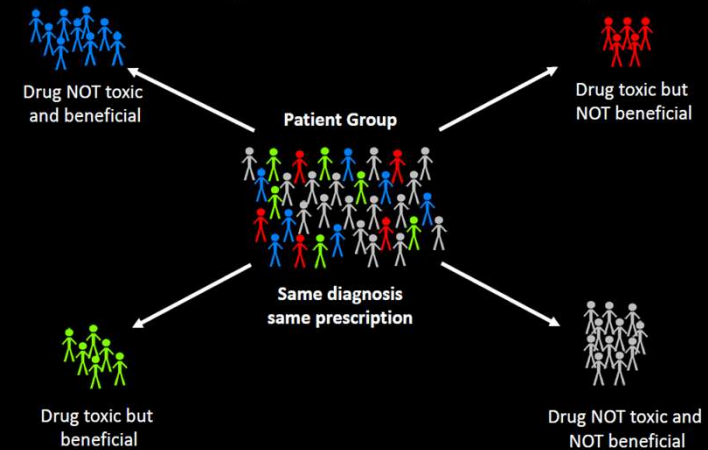
# Machine Learning for Subphenotype Discovery

Danielle Belgrave  
Healthcare Machine Learning

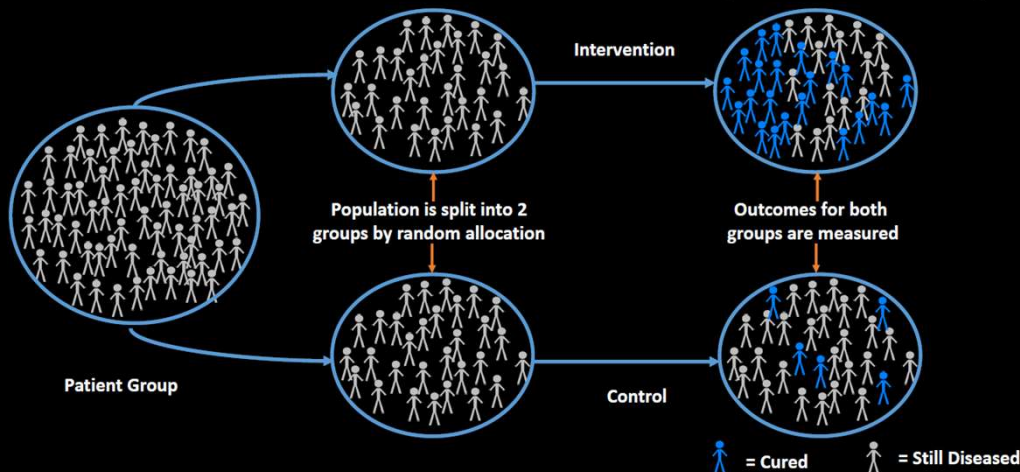


Imperial College  
London

## Need For Personalised Treatment and Management Strategies

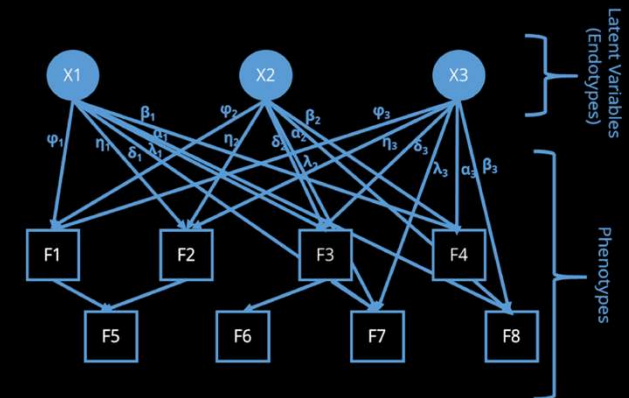


## Randomised Control Trial: Traditional Approach to Drug Discovery

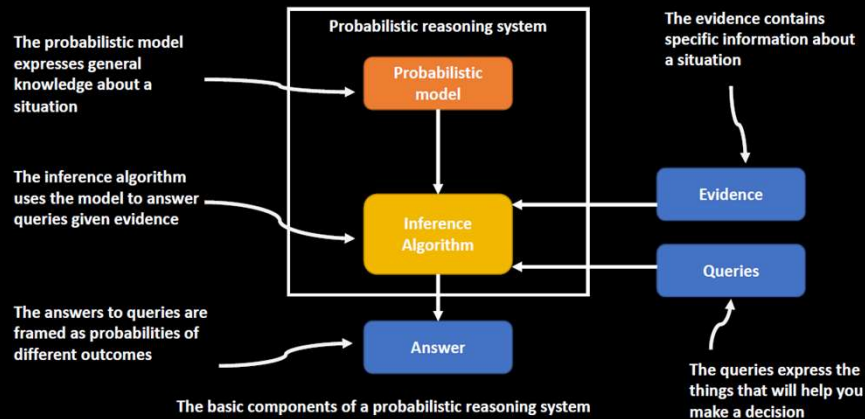


## Generalised Framework for Identifying Disease Endotypes

Parsimonious description of the data inferred from what is observed

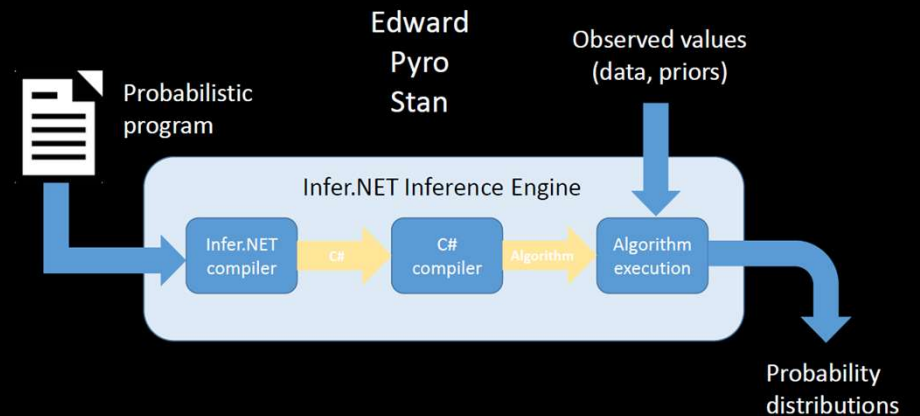


## Probabilistic Programming: tool for identifying latent structure

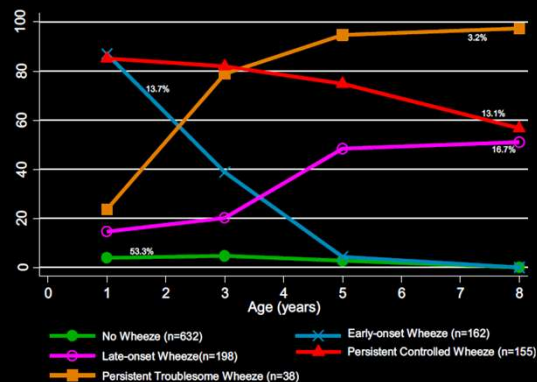


Adapted from Pfeffer, Avi. "Practical probabilistic programming." *International Conference on Inductive Logic Programming*. Springer Berlin Heidelberg, 2010.

# Eco-systems for Probabilistic Programming



## Asthma: A Heterogeneous Phenomenon



## 5 distinct subtypes

## Distinct genetic and environmental characteristics

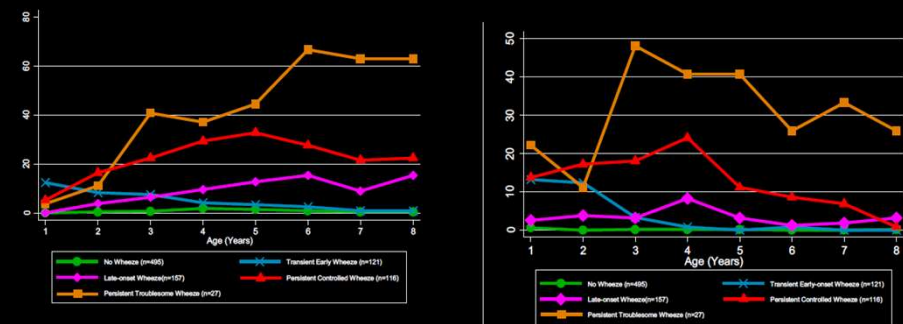
## Distinct allergic responses

## Distinct triggers

Danielle CM Belgrave, Angela Simpson, Aida Semic-Jusufagic, Clare S. Murray, Iain Buchan, Andrew Pickles, and Adnan Custovic.

"Joint modeling of parentally reported and physician-confirmed wheeze identifies children with persistent troublesome wheezing." *Journal of Allergy and Clinical Immunology* 132, no. 3 (2013): 575-582.

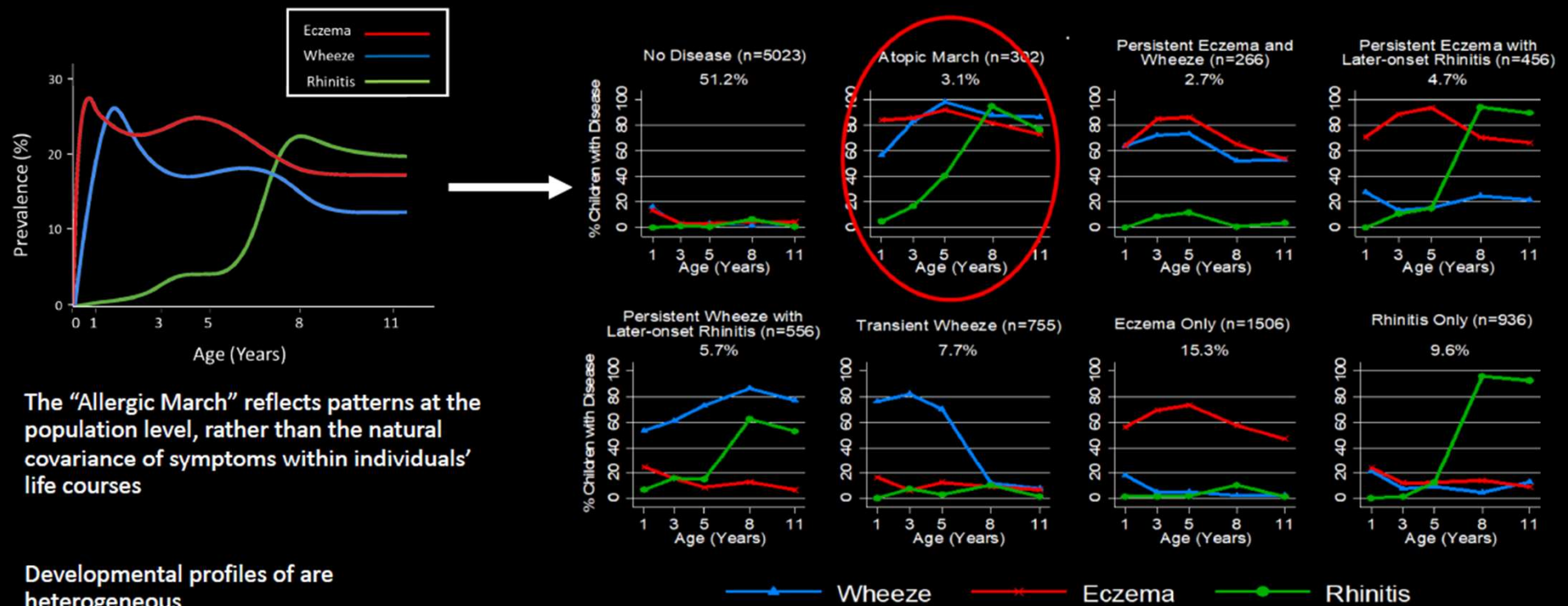
## Asthma Endotype-Dependent Response to Treatment



Danielle CM Belgrave, Angela Simpson, Aida Semic-Jusufagic, Clare S. Murray, Iain Buchan, Andrew Pickles, and Adnan Custovic.

"Joint modeling of parentally reported and physician-confirmed wheeze identifies children with persistent troublesome wheezing." *Journal of Allergy and Clinical Immunology* 132, no. 3 (2013): 575-

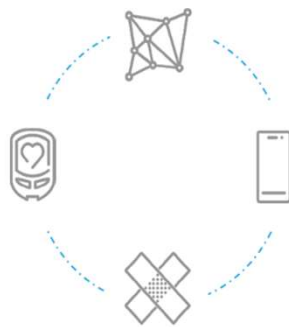
# Disaggregating Symptom Heterogeneity



From: Developmental Profiles of Eczema, Wheeze, and Rhinitis: Two Population-Based Birth Cohort Studies. PlosMedicine 2014  
Danielle CM Belgrave, Raquel Granell, Angela Simpson, John Guiver, Christopher Bishop, Iain Buchan, A. John Henderson, and Adnan Custovic



## Non invasive artificial pancreas



RE-WORK

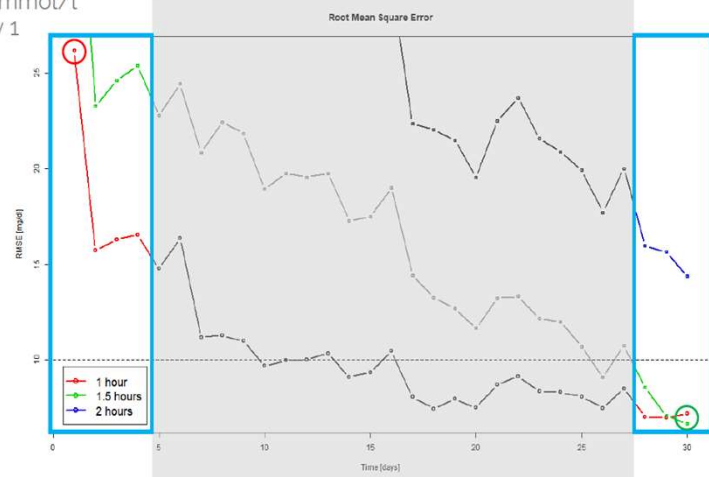


Gathers data from wearable sensors



## Improved performance with training

1.4 mmol/L  
day 1

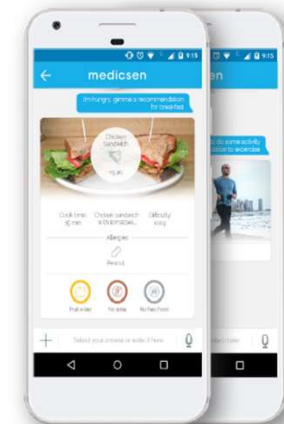


0.3 mmol/L  
day 30

## What can I have for lunch today?

- 15g of CHO
- 30% complex CHO
- 3.9-8.0 mmol/L

## Algorithm's output



RE-WORK

FOCUS

## 우울증약, 왜 누구에겐 듣고 누구에겐 효과없을까?

〈KISTI의 과학향기〉 제3359호

우울증약이 모두에게 듣는 것은 아니다

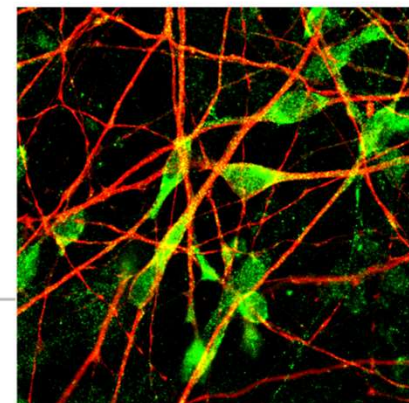
한데 문제가 있다. SSRI만을 단독으로 투여했을 때 기분이 개선되는 환자가 있고, 그렇지 않다는 환자가 있다는 것. 연구에 따르면 우울증 환자 중 30% 정도에서 SSRI가 아무런 효과를 내지 못했다고 한다. 그 이유 역시 몰랐다.

최근 미국의 소크 생물학연구소 연구팀은 왜 SSRI가 누구에게는 듣고 누구에게는 듣지 않는지 그 이유를 알아낼 단서를 발견했다. 그것은 바로 환자마다 세로토닌을 분비하는 신경세포의 돌기 모양 차이 때문이라고 한다.

신경세포는 수상돌기라는, 마치 가지처럼 뻗어 나온 돌기를 갖고 있는데 이곳은 다른 신경세포의 신호를 받아들여 아래쪽에 있는 신경세포체에 전달하는 역할을 한다. 따라서 이런 신호 전달 기제가 깨지면 각종 질병이 발생할 수 있다.

연구팀은 우울증 환자 800여 명의 피부 세포를 채취한 뒤에 이를 줄기세포 재프로그래밍 기술을 이용해 피부 세포를 유도만능줄기세포로 전환하고 다시 이를 세로토닌 뉴런으로 분화시켰다. 그런 다음 항우울제가 듣는 환자와 듣지 않는 환자의 뉴런을 비교 분석했다.

그 결과 뉴런 자체에는 항우울제가 잘 듣는 환자와 잘 듣지 않는 환자 간의 어떤 차이도 없었으니 수상돌기의 모양에는 극적인 차이가 있었다. 항우울제가 잘 듣지 않는 환자의 수상돌기는 그렇지 않은 사람에 비해 길이가 훨씬 길었다. 수상돌기의 길이가 왜 약 반응의 차이를 만들까?



## 건강관리 방법의 변화

### 1<sup>st</sup> generation

- Based on the experience (self, parents, senior etc.)
- Separated with hospital

### 2<sup>nd</sup> generation

- Based on the information by googling
- Gradually contributed by hospital with wearable healthcare devices

### 3<sup>rd</sup> generation

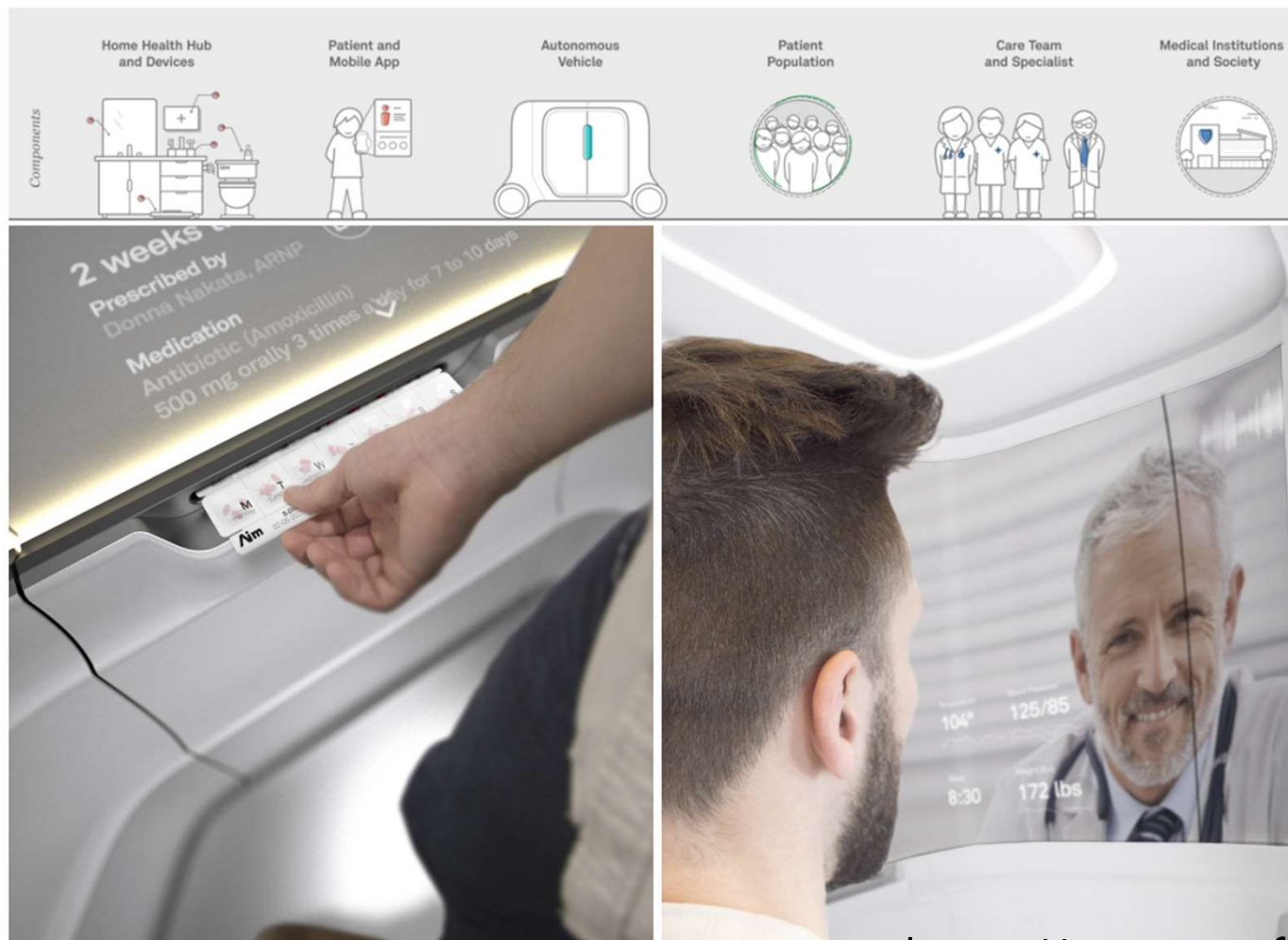
- Based on the simulation model by Virtual Human Digital Twin
- Boundary disappearance of hospitals and daily health care

**Bio signal which is not used for the simulation of Digital twin will not be collected and not used in healthcare also.**



## 의료 이용 방식의 변화

### From Hospital-Centered To Patient-Centered (Modernized House Call)



## Changes in Medical insurance

### Amazon is now offering virtual health care to its employees

*Amazon Care offers medical care on the go*

By [Mary Beth Griggs](#) | Sep 24, 2019, 5:31pm EDT

f   SHARE



The company has also been focused on the health of its internal health insurance program. Last year, it teamed up with Berkshire Hathaway and JP Morgan to create a new health care company for the three organizations' employees, a move that was explicitly designed to combat rising health care costs. That decision was cheered by telemedicine companies soon after the announcement, who anticipated a shift toward virtual services, like Amazon Care.

## Disassembling of Current Medical Service

**All in One Service**  
**Individual Human Simulation model**  
**Hospital Centered Care**



**Individual Service**  
**Integrated AI Simulation Model**  
**Insurance Centered Care**



## The Locomotives on Highways Act (Red Flag Act)



영국에서 만들어진 법으로 '붉은 깃발법' 이라고도 한다. 정식 명칭은 'The Locomotives on Highways Act'. 줄여서 'Locomotive Act' 라고도 한다. 3번에 걸쳐 개정되었다. 이른바 '적기조례' 라고 알려진 것은 1865년의 2차 개정법률.

세계 최초의 교통법이라는 타이틀을 가지고 있지만 실상은 권위주의의 병폐이자 악법. 제도가 현실을 따라가지 못하면 어떤 일이 벌어지는가를 보여주는 사례. 단순히 요약하자면 '자동차 보급되면 마부들이 실직하니 자동차는 말보다 느리게 다니세요' 라는 내용이다.

## Suggestion for “Preparing for the Future Medical Age”

### 1. Bigdata 친화형 의료기기 산업 지원

- 대부분의 의료기기는 Rawdata 자체를 제공하지 않고, 2차 분석 결과만을 제공함. 이러한 의료기기는 향후 AI 시대에 적합하지 않음.
- 2차 분석 결과를 도출하게 된 근거자료(Rawdata)를 EMR에 직접 연동 가능한 의료기기 지원책(규제책)의 선제적 도입 필요

※ 표준 Data 포맷 개발, EMR과 연계를 위한 SW시스템, Data Quality 관리방안 등 관련 기술의 동시 개발 필요 (ex. 의료영상에서의 DICOM, PACS)

## Suggestion for “Preparing for the Future Medical Age”

### 2. 의료 Bigdata 구축을 위한 핵심 인력 양성

- 의료 Bigdata 구축을 위해서는 의료에 대한 전문 지식과 Data 및 AI에 대한 이해를 동시에 갖춘 핵심 인재가 필요
- 그러나 AI 및 Data 분석 전문가가 의료 전문지식을 쌓는 것은 거의 불가능하며, 현재 의료인중에 AI에 대한 이해도가 높은 인력도 매우 희소
- 의료인에 대한 AI 관련기업 병역 특례 우선 선발 제도 도입 및 지원책 마련 및 전문의를 군의관 대신 AI 업체에서 대체복무를 할수 있도록 하는 제도 마련 필요 (현재는 병역법시행령 120조에 의해 전문의는 반드시 군의관으로 입대)



## Suggestion for “Preparing for the Future Medical Age”

### 3. 건강 보험 공단의 의료 Bigdata 센터화

- 의무기록이 병원내에서, 혹은 외부 업체로 전송되어 AI개발에 활용되는 것은 사실상 불가능함

※ 병원별로 AI를 개발할 경우 데이터 규모의 문제, 외부 기관으로 전송되는 경우 개인정보 보호의 문제가 있음

- 국가 기관이 보험 수가에 대한 근거자료를 이유로 데이터 제공을 요구하는 것은 국민 저항이 거의 없으며, 개인정보 이슈도 없음

- 또한 이에 대한 보험수가 인센티브 제도 도입(초기 Positive incentive → 후기 Negative incentive)을 통해 의사로 하여금 Pair set을 구축하도록 유도 가능

## Suggestion for “Preparing for the Future Medical Age”

### 4. 동아시아 의료 Bigdata Hub 구축 및 인공지능 의료 선두국가 진입을 통한 글로벌 허브 병원 구축

- 한국은 동아시아에서 가장 뛰어난 IT 인프라와 의료기술을 가진 최상위 국가
- 이러한 인프라를 적극 활용하여 “Bigdata 친화형 병원 시스템 개발” 및 이러한 IT와 의료의 결합된 의료 모델 자체를 수출하고
- 수출된 병원에서도 수집되는 의료 Bigdata를 통해 더 수준높은 AI를 개발하는 선 순환구조 구축으로 미래 의료 선두국가로 자리매김 가능

**경청해 주셔서 감사합니다.**